WE CLAIM:

1.   1.   A quantizer for scaling a video information signal
2. comprising:
3.   a scaling factor generator employing a non-linear
4. scaling function, and
5.   a divider for dividing the video information signal
6. by a scaling factor provided by the scaling factor
7. generator.

1.   2.   The quantizer of claim 1, wherein the scaling factor
2. generator includes a memory in which scale factors are
3. stored.

1.   3.   The quantizer of claim 1, wherein the scaling factor
2. generator is a processor that computes the scaling
3. factors.

1.   4.   The quantizer of claim 1, wherein:
2.   the video information contains luminance information,
3.   the scaling factor generator generates a luminance
4. scaling factor, and
5.   the divider divides the luminance information by the
6. luminance scaling factor and generates a luminance level
7. signal therefrom.

1.   5.   The quantizer of claim 4, wherein the luminance
2. scaling factor is generated from a luminance scaling
3. function based on a quantization parameter, and
4.   wherein the luminance scaling function approximates
5. a constant level for low values of the quantization
6. parameter and approximates a line representing twice the
7. quantization parameter for large values of the
8. quantization parameter.

1 6. The quantizer of claim 4, wherein the luminance
2 scaling factor is generated from a piece-wise luminance
3 scaling function based on a quantization parameter.

1 7. The quantizer of claim 1, wherein:
2 the video information contains DC chrominance
3 information,
4 the scaling factor generator generates a chrominance
5 scaling factor, and
6 the divider divides the DC chrominance information by
7 the chrominance scaling factor and generates a chrominance
8 level signal therefrom.

1 8. The quantizer of claim 7, wherein the chrominance
2 scaling factor is generated from a non-linear chrominance
3 scaling function based on a quantization parameter, and
4 wherein the chrominance scaling function approximates
5 a constant level for low values of the quantization
6 parameter and approximates a line representing the
7 quantization parameter for large values of the
8 quantization parameter.

1 9. The quantizer of claim 7, wherein the chrominance
2 scaling factor is generated from a piece-wise chrominance
3 scaling function based on a quantization parameter.

1 10. The quantizer of claim 1, wherein:
2 the video information contains luminance and
3 chrominance information,
4 the scaling factor generator generates a luminance
5 scaling factor and a chrominance scaling factor, and
6 the divider comprises:
7 a first divider that divides the luminance
8 information by the luminance scaling factor and generates

9 a luminance level signal therefrom, and

10   a second divider that divides the chrominance

11 information by the chrominance scaling factor and

12 generates a chrominance level signal therefrom.

1 11.   The quantizer of claim 10, wherein

2   the luminance scaling factor is generated from a

3 piece-wise luminance scaling function based on a

4 quantization parameter,

5   the chrominance scaling factor is generated from a

6 piecewise chrominance scaling function based on the

7 quantization parameter, and

8   for all values of the quantization parameter, the

9 chrominance scaling function is less than the luminance

10 scaling function.

1 12.   The quantizer of claim 1, wherein:

2   the video information contains AC chrominance

3 information,

4   the scaling factor generator generates an AC

5 chrominance scaling factor, and

6   the divider divides the AC chrominance information by

7 the AC chrominance scaling factor and generates an AC

8 chrominance level signal therefrom.

1 13.   The quantizer of claim 12, wherein the AC chrominance

2 scaling factor is generated from an AC chrominance scaling

3 function based on a quantization parameter, and

4   wherein the AC chrominance scaling function

5 approximates a constant level for low values of the

6 quantization parameter and approximates a line

7 representing one half the quantization parameter for large

8 values of the quantization parameter.

1   14. The quantizer of claim 12, wherein the AC chrominance
2   scaling factor is generated from a piece-wise AC
3   chrominance scaling function based on a quantization
4   parameter.

1   15. A dequantizer for scaling a signal containing a
2   quantized video information signal comprising:
3   a scaling factor generator generating a scaling
4   factor generator based on a non-linear scaling function,
5   and
6   a multiplier for multiplying the quantized video
7   information signal by the scaling factor.

1   16. The dequantizer of claim 15, wherein the scaling
2   factor generator is a memory stored with scale factors.

1   17. The dequantizer of claim 15, wherein the scaling
2   factor generator is a processor that computes the scaling
3   factors.

1   18. The dequantizer of claim 15, wherein:
2   the quantized video information contains a luminance
3   level signal,
4   the scaling factor generator generates a luminance
5   scaling factor, and
6   the multiplier multiplies the luminance level signal
7   by the luminance scaling factor and generates a luminance
8   information signal therefrom.

1   19. The dequantizer of claim 18, wherein the luminance
2   scaling factor is generated from a luminance scaling
3   function based on a quantization parameter, and
4   wherein the luminance scaling function approximates
5   a constant level for low values of the quantization

6 parameter and approximates a line representing twice the
7 quantization parameter for large values of the
8 quantization parameter.

1 20. The dequantizer of claim 18, wherein the luminance
2 scaling factor is generated from a piece-wise luminance
3 scaling function based on a quantization parameter.

1 21. The dequantizer of claim 15, wherein:
2 the quantizer video information contains DC
3 chrominance level signal,
4 the scaling factor generator generates a chrominance
5 scaling factor, and
6 the multiplier multiplies the DC chrominance level
7 signal by the chrominance scaling factor and generates a
8 DC chrominance information signal therefrom.

1 22. The dequantizer of claim 21, wherein the chrominance
2 scaling factor is generated from a non-linear chrominance
3 scaling function based on a quantization parameter, and
4 wherein the chrominance scaling function approximates
5 a constant level for low values of the quantization
6 parameter and approximates a line representing the
7 quantization parameter for large values of the
8 quantization parameter.

1 23. The dequantizer of claim 21, wherein the chrominance
2 scaling factor is generated from a piece-wise chrominance
3 scaling function based on a quantization parameter.

1 24. The dequantizer of claim 15, wherein:
2 the video information contains a luminance level
3 signal and chrominance level signal;
4 the scaling factor generator generates a luminance

5 scaling factor and a chrominance scaling factor; and

6   the multiplier comprises:

7   a first multiplier that multiplies the luminance

8   level signal with by the luminance scaling factor and

9   generates a luminance information signal therefrom,

10   and

11   a second multiplier that multiplies the chrominance

12   level signal by the chrominance scaling factor and

13   generates a chrominance information signal therefrom.

1 25. The dequantizer of claim 24, wherein

2   the luminance scaling factor is generated from a

3 piece-wise luminance scaling function based on a

4 quantization parameter,

5   the chrominance scaling factor is generated from a

6 piecewise chrominance scaling function based on the

7 quantization parameter, and

8   for all values of the quantization parameter, the

9 chrominance scaling function is less than the luminance

10 scaling function.

1 26. The dequantizer of claim 15, wherein:

2   the quantized video information contains an AC

3 chrominance level signal,

4   the scaling factor generator generates an AC

5 chrominance scaling factor, and

6   the multiplier multiples the AC chrominance level

7 signal by the AC chrominance scaling factor and generates

8 an AC chrominance information signal therefrom.

1 27. The dequantizer of claim 26, wherein

2   the AC chrominance scaling factor is generated from

3 an AC chrominance scaling function based on a quantization

4 parameter, and

5   the AC chrominance scaling function approximates a
6 constant level for low values of the quantization
7 parameter and further approximates a line representing one
8 half the quantization parameter for large values of the
9 quantization parameter.

1 28. The dequantizer of claim 26, wherein the AC
2 chrominance scaling factor is generated from a piece-wise
3 AC chrominance scaling function based on a quantization
4 parameter.

1 29. A method of quantizing a video information signal,
2 comprising the steps of:
3   generating a scaling factor based on a non-linear
4 scaling function,
5   dividing the video information signal by the non-
6 linear scaling function, and
7   outputting the divided video information signal.

1 30. A method of dequantizing a quantized video
2 information signal, said video information signal
3 characterized by a plurality of macro blocks, each macro
4 block quantized according to a plurality of quantization
5 parameter, the method comprising the steps of:
6   receiving the quantized video information signal
7 identifying the macro blocks,
8   identifying a quantization parameter update from the
9 quantized video information signal,
10   generating a quantization parameter change based on
11 the quantization parameter and the quantization parameter
12 update,
13   generating a scaling factor for the macro block based
14 on the quantization parameter and the quantization
15 parameter change, and

16   multiplying quantized video information of the macro
17 block by the scaling factor to obtain dequantized video
18 information.

1 31. An encoder for encoding video signals, comprising:
2   a processing circuit that generates blocks of video
3 data from the video information signal,
4   a transform circuit that generates video coefficients
5 representative of the blocks of video data,
6   a quantizer circuit that quantizes the video
7 coefficients according to a non-linear scaler function,
8 and
9   a variable length coder that generates a variable
·10 length code based on the quantized video coefficients.

1 32. The encoder of claim 31, wherein the non-linear
2 scaler function is piece-wise linear.

1 33. A decoder for decoding encoded video signals,
2 comprising:
3   a variable length decoder that generates quantized
4 video coefficients from variable length coded contained
5 within the encoded video signals,
6   a dequantizer circuit that dequantizes the video
7 coefficients according to a non-linear scalar function,
8   an inverse transform circuit that transforms the
9 video coefficients into blocks of video data, and
10   a processing circuit that generates a video signal
11 from the blocks of video data.

1 34. The decoder of claim 33, wherein the non-linear
2 scaler function is piece-wise linear.